ATTACHMENT FOUR

PROPOSED TECHNICAL SPECIFICATION BASES REVISIONS

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BASES

via the CVCS blending tee.

3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: (1) the reactor will remain subcritical during CORE ALTERATIONS, and (2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. The limitation on K_{eff} of no greater than 0.95 is sufficient to prevent reactor criticality during refueling operations. The locking closed of the required valves during refueling operations precludes the possibility of uncontrolled boron dilution of the filled portions of the Reactor Coolant System. This action prevents flow to the RCS of unborated water by closing all automatic flow paths from sources of unborated water. INSERT A These limitations are consistent with the initial conditions assumed for the boron dilution incident in the safety analyses.

3/4.9.2 INSTRUMENTATION

The OPERABILITY of the Source Range Neutron Flux Monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the fuel handling accident radiological consequence and spent fuel pool thermal-hydraulic analyses.

3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

The requirements on containment building penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

The OPERABILITY of this system ensures the containment purge penetrations will be automatically isolated upon detection of high radiation levels within containment. The OPERABILITY of this system is required to restrict the release of radioactive materials from the containment atmosphere to the environment.

The restriction on the setpoint for GT-RE-22 and GT-RE-33 is based on a fuel handling accident inside the Containment Building with resulting damage to one fuel rod and subsequent release of 0.1% of the noble gas gap activity, except for 0.3% of the Kr-85 gap activity. The setpoint concentration of 5E-3 uCi/cc is equivalent to approximately 150 mR/hr submersion dose rate.

3/4.9.5 COMMUNICATIONS

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity conditions during CORE ALTERATIONS.

INSERT A

Administrative controls will limit the volume of unborated water which can be added to the refueling pool for decontamination activities in order to prevent diluting the refueling pool below the limits specified in the LCO.

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ATTACHMENT FIVE

PROPOSED FSAR CHANGES

reestablished, the fuel pool cooling pumps are manually loaded to the Class IE power source, and CCW flow is established to at least one of the fuel pool cooling heat exchangers.

The bulk spent fuel pool and in-cell thermal hydraulic analysis (including the associated assumptions and input parameters) given in Appendix 9.1A supports the data provided in Table 9.1-4.

Redundant, safety-related sources of makeup water are supplied to the spent fuel pool by the ESW system, via manually operated valves. This source of makeup is to be used only when nonsafety-related makeup sources are not available.

During normal shutdown of the reactor, the RHR system is utilized to remove core decay heat, as described in Section 5.4.7. At 4 hours after shutdown, the RHR heat exchanger represents sufficient available CCW system duty to require terminating CCW flow to the FPCCS heat exchangers. Under this mode of operation, the spent fuel pool temperature is allowed to rise to a maximum of 160 F, at which point flow is reestablished to the FPCCS heat exchangers and sufficient excess CCWS capacity exists to handle the spent fuel pool duty.

9.1.3.2.3.2 Fuel Pool Cleanup System

Normal fuel pool cleanup system operation is manual and intermittent. The system is started, operated, and secured locally, as required, to maintain optical clarity and to limit ionic corrosion and fission product concentration in the spent fuel pool and the refueling pool. During normal system operation, both fuel pool cleanup pumps can be run to obtain maximum system capability. Samples are periodically taken from the cleanup loop to determine the quality of the water.

During a refueling, after the refueling pool is filled with borated water from the RWST, the fuel pool cleanup pumps take suction from the refueling pool and transfer the water through both fuel pool cleanup filters and the fuel pool cleanup demineralizer and back to the refueling pool. The cleanup of the refueling pool by the fuel pool cleanup system is augmented by the CVCS via the RHR system to expedite the cleanup process.

→ INSERT 1

INSERT 1

During this time, items removed from the refueling pool are sprayed down using reactor makeup water. This is performed to facilitate the decontamination of those items. Administrative controls are established to prevent diluting the pool below acceptable boron concentration limits.

at least 2000 ppm boron. This concentration, together with the negative reactivity of the control rods, is sufficient to keep the core approximately 5-percent Δk/k subcritical during the refueling operations. It is also sufficient to maintain the core subcritical in the unlikely event that all of the RCC assemblies were removed from the core.

INSERT 2 →

b. The water level in the refueling pool is high enough to keep the radiation levels within acceptable limits when the fuel assemblies are being removed from the core.

The refueling operation is divided into five major phases:

Phase I - Preparation

Phase II - Reactor disassembly

Phase III - Fuel handling

Phase IV - Reactor reassembly

Phase V - Preoperational checks and startup

Phase I - Preparation

The reactor is shut down, borated, and cooled to cold shutdown conditions (≤140 F) with a final k_{eff} ≤0.95 and all rods inserted.

Prior to entering the containment, the containment atmospheric control system is operated, as required, to reduce radioactive halogens. When the containment radioactive iodine concentration reaches acceptable levels to meet offsite dose limits, the containment purge system purges the containment of noble gases.

Following a radiation survey, the containment is cleared for refueling personnel entry. At this time, the pressurizer is full of water, and the reactor coolant is degassed and purified. The pressurizer is next vented to the pressurizer relief tank via a hose connection between the pressurizer vent and the PRT vent with a nitrogen cover pressure of ≤1 psig being maintained on the pressurizer. This cover pressure will initially avoid a hydrogen hazard when air is admitted to the system through the vents. The RHR system is in operation, and the safety injection pumps and accumulator isolation valves are either locked out or closed and deenergized. The gaseous radwaste system is in operation, and sufficient holdup tank capacity is available to receive reactor coolant from impending draindown.

The pressurizer spray valves are in the manual control mode and are fully open with the pressurizer heater circuit breakers open and tagged. The setpoint of the pressurizer relief tank

j. The control rod drive shafts are disconnected from the RCC assemblies and, with the upper internals, are removed from the vessel and stored in the refueling pool or stored in the racks designed for this purpose.

k. The fuel assemblies and RCC assemblies are now free from obstructions, and the system is ready for the fuel handling phase.

Phase III - Fuel Handling

Prior to initiation of the refueling sequence, the refueling pool water level is raised to the same level as the spent fuel pool and either the gate valve is opened or the transfer slot gate is removed. In this condition, there is communication between the fuel building pools and the refueling pool; therefore, level monitoring, including a low level alarm, is provided by the fuel pool cooling and cleanup system.

INSERT 2 →

The refueling sequence is started with the refueling machine. Spent fuel assemblies are removed from the core in the sequence prepared by plant personnel before each refueling. The positions of partially spent fuel assemblies are changed, and new fuel assemblies are transferred to the core.

A typical fuel handling sequence is:

a. The refueling machine is positioned over a fuel assembly in the most depleted region of the core.

b. The fuel assembly is lifted by the refueling machine to a predetermined height sufficient to clear the reactor vessel and still leave sufficient water covering to eliminate any radiation hazard to the operating personnel.

c. If the removed assembly contains an RCC unit or a source assembly, the assembly is placed in the RCC changing fixture by the refueling machine or it may be transferred to the fuel building for changeout using the portable RCC change tool. The RCC assembly is removed from the spent fuel assembly and deposited in a partially spent or new fuel assembly previously placed in the changing fixture. If a removed assembly contains a burnable poison rod assembly or assemblies other than an RCC unit, the assembly remains intact until the fuel assembly reaches the spent fuel pool where it may be removed by a handling tool and placed in the rack insert.

INSERT 2

While the refueling pool is flooded, items removed from the pool are sprayed down using reactor makeup water. This is performed to facilitate the decontamination of those items. Administrative controls are established to prevent diluting the pool below acceptable boron concentration limits.

o. Any new fuel assembly or transferred fuel assembly that is placed in a control position is first placed in the RCC changing fixture to receive an RCC unit from a spent fuel assembly or a partially spent fuel assembly which is being removed from a control position unless an RCC was received in the spent fuel pool.

p. This procedure is continued until refueling is completed.

The reactor is now ready for the reassembly phase.

Phase IV - Reactor Reassembly

The reactor reassembly, following refueling, is essentially achieved by reversing the operations given in Phase II - Reactor Disassembly. The following steps are not necessarily performed in the order shown here.

The general sequence is:

a. Close the gate valve on the fuel building side of the fuel transfer tube or place the gate on the west transfer slot of the spent fuel pool.

b. The reactor vessel upper internals are replaced in the vessel by the polar crane. The internal lifting rig is removed to storage.

c. The CRD shafts are relatched to the RCC elements.

d. Initiate draining of the refueling pool, utilizing the RHR pumps and their connections in the hot legs of the reactor coolant loops. INSERT 3

~~e. The water level is drained to just below the flange.~~

~~f. Complete pumping of the refueling pool, using the reactor coolant drain tank (RCDT) pumps and the piping connection to the RCC changing fixture pit.~~

~~g. The refueling pool is completely drained, and the flange surface is cleaned.~~

h. The reactor vessel head is lifted using the polar crane and positioned above the refueling pool, lowered to a height just above the guide studs, moved over the vessel flange and lowered onto the vessel.

INSERT 3

During this draining evolution, the refueling pool walls are sprayed down with reactor makeup water to facilitate decontamination activities. Administrative controls are established to prevent diluting the pool below acceptable boron concentration limits.

e. The water level is drained to approximately one foot above the reactor cavity seal/shield ring. The pool is then drained via the reactor coolant drain tank (RCDT) pumps or other available means (excluding the RHR system) until the level is below the cavity seal/shield ring. This will direct the potentially diluted layer of water at the top of the pool away from the reactor vessel and core.

f. After the level has been lowered to below the cavity seal/shield ring, further draining of the area enclosed by the inside diameter of the ring will be performed via the RHR connection to CVCS letdown.

g. Complete draining the remainder of the refueling pool as needed via the RCDT pumps or other available means. After draining is completed, the reactor vessel flange surface is cleaned.

These administrative controls will minimize the amount of unborated water which could enter the reactor vessel from washdown procedures.

4. Overtemperature ΔT turbine runback (at power)

5. Overtemperature ΔT reactor trip

6. Power range neutron flux - high, both high and low setpoint reactor trips.

This event is classified as an ANS Condition II incident (a fault of moderate frequency) as defined in Section 15.0.1.

15.4.6 2 Analysis of Effects and Consequences

To cover all phases of plant operation, boron dilution during Refueling, Cold Shutdown, Hot Shutdown, Hot Standby, Start-up, and Power modes of operation is considered in this analysis. Conservative values for necessary parameters were used, i.e., high RCS critical boron concentrations, high boron worths, minimum shutdown margins, and lower than actual RCS volumes. These assumptions result in conservative determinations of the time available for operator or system response after detection of a dilution transient in progress. Dilution flow rates listed for each mode are based on the dilution source fluid conditions for reactor makeup water at 37°F and 14.7 psia. The analysis results presented are based on calculations which account for density compensation between these dilution source conditions and the mode-specific RCS conditions listed.

Dilution During Refueling (Mode 6)

An uncontrolled boron dilution transient ~~cannot~~ will not occur via the CVCS blending tee during this mode of operation. Inadvertent dilution is prevented by administrative controls which isolate the RCS from the potential source of unborated water. Valves BG-V-178 and BG-V-601 (or BG-V-602) in the CVCS will be locked closed during refueling operations. These valves block all automatic flow paths that could allow unborated makeup water to reach the RCS. INSERT 4 Any makeup which is required during refueling will be borated water supplied from the RWST by the RHR pumps.

Dilution During Cold Shutdown (Mode 5)

The following conditions are assumed for inadvertent boron dilution while in this operating mode:

a. Dilution flow is limited by a flow orifice at the RMWS-CVCS system interface to 150 gpm of unborated water. BG-V-0178 is closed during Mode 5.

b. A minimum mixing volume of 8995 ft^3 in the RCS is used. This volume corresponds to the active volume of the RCS with one reactor coolant pump in operation, and does not include any volume in the pressurizer or its surge or spray lines, the vessel head, the CVCS, or the RHR system. The volume specified here is

INSERT 4

Administrative controls will limit the volume of unborated water which can be added to the refueling pool for decontamination activities in order to prevent diluting the refueling pool below the limits specified in Technical Specification LCO 3.9.1.

b. Rod insertion limit - low-low level alarm if insertion continued after item a

c. Axial flux difference alarm (ΔI outside of the target band).

Given the many alarms, indications, and the inherent slow process of dilution at power, the operator has sufficient time for action. For example, the operator has at least 69 minutes from the rod insertion limit low-low alarm until shutdown margin is lost at beginning-of-life. The time would be significantly longer at end-of-life, due to the low initial boron concentration. For the automatic reactor control case, a letdown flow of 150 gpm has been evaluated and found to be acceptable (greater than 62 minutes from the rod insertion limit low-low alarm until shutdown margin is lost).

The above results demonstrate that in all modes of operation, an inadvertent boron dilution is precluded or responded to by automatic functions, or sufficient time is available for operator action to terminate the transient. Following termination of the dilution flow and initiation of boration, the reactor is in a stable condition with the operator regaining the required shutdown margin.

15.4.6.3 Conclusions

Inadvertent boron dilution events are ~~precluded during refueling and~~ automatically terminated during cold shutdown, hot shutdown, and hot standby modes. Inadvertent boron dilution events during start-up or power operation, if not detected and terminated by the operators, will result in reactor trip. Following reactor trip, there is ample time available for the operators to terminate the dilution prior to a return to criticality.

15.4.7 INADVERTENT LOADING AND OPERATION OF A FUEL ASSEMBLY IN IMPROPER POSITION

15.4.7.1 Identification of Causes and Accident Description

Fuel and core loading errors that can arise from the inadvertent loading of one or more fuel assemblies into improper positions, loading a fuel rod during manufacture with one or more pellets of the wrong enrichment, or the loading of a full fuel assembly during manufacture with pellets of the wrong enrichment will lead to increased heat fluxes if the error results in placing fuel in core positions calling for fuel of lesser enrichment. Also included among possible core loading errors is the inadvertent loading of one or more fuel assemblies requiring burnable poison rods into a new core without burnable poison rods.

Any error in enrichment, beyond the normal manufacturing tolerances, can cause power shapes which are more peaked than those calculated with the correct enrichments. There is a